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ABSTRACT

This study was designed to show the effects of three instructicnal strategies incorporating the use of the cognitive and affective taxcncmies on the kinds of questions preservice teachers ask children in reading instruction. The strategies, administered to 120 preservice elementary teachers enrolled in language-arts methcds classes, invclved 1) traditional approaches without any emphasis cn the kind of questions asked, 2) the use of Krathwohl's taxonomy of the affective dcmain, and 3) the use of Bloom's taxonomy of the cognitive domain. A post-test required 10 teachers from each group to teach a videc-taped mini-lesscn and the questions asked by them were clas ified in four categories: cognitive-memory, convergent, divergent, and evaluative. Analysis of variance, t tests, and chi-square prccedures were applied to the data, and the following findings ctained: 1) As a result of analysis of variance, the three strategies did not show any significant differential effects. 2) As a result of multiple t analysis, the cognitive group showed a significantly larger use of critical-type questions than the traditional group. 3) The affective group showed a favorable tendency toward the increased use of evaluative-type questions compared with the traditional group. (MBM)

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THE EFFECTS OF INSTRUCTION BASED ON ELEMENTS OF CRITICAL READING UPON THE QUESTIONING PATTERNS OF PRESERVICE TEACHERS

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CHAPTER I

INTRODUCTION

The overarching objective of education is to educe higher-order thinking and right attitudes on the part of the learner, and effective teaching is recognized as a key factor in offering children opportunities to learn. The emphasis in recent years placed by educational directors upon the inclusion of "goals" or "objectives" in teachers' plans has resulted in widespread awareness of the kinds of thinking which teachers intend to stimulate in their pupils. The fact that many teachers fail to activate in a given lesson the very specific objectives clearly stated in their lesson plans gives rise to the present study: a search for a way in which teachers can be helped to implement their knowledge of objectives; can be assisted in achieving their stated goals.

Background

Most children are able by the age of six to cope with all the basic types of thinking abilities possessed by adults (Menyuk, 1963; Bloom, 1964). They manifest the characteristics present in critical thought: making judgments, seeing relationships, and drawing conclusions (McCullough, 1957). That teachers are aware of the kinds of thinking they intend to arouse in their pupils has been

demonstrated in the production of the Taxonomy of Educational Objectives (Bloom et al., 1956). However, several recent investigators (Guszak, 1966; Wolf, 1966; Hunkins, 1966) have reported that teachers in general do not require critical, analytical and evaluative thinking of their charges. Can this gulf be bridged? Can the awareness level of teachers be extended to a commitment to an effective teaching level? This study is concerned with the answer to that question.

Formal reading instruction is a prime setting for uniting effective teaching techniques with learning opportunity. No matter what approach to reading instruction is employed, questions are an important part of that instruction, and the right use of questions is one of the chief means of stimulating children to think. Opportunity for learning implies that the thinking stimulated be of a critical as well as of a literal nature. Critical thinking includes all thought processes beyond the memory category. In reading instruction--whatever the method employed--analytical and evaluative thinking occur as a function of critical reading. Yet studies imply that the teaching of critical reading skills is usually postponed to the upper grades, while word recognition and literal comprehension are emphasized in the lower grades (Wolf, King, and Huck, 1968). The present study focuses on developing a way of preparing preservice classroom teachers for formal reading

instruction. The specific objective of this "new way" is to help these teachers develop questioning patterns which will elicit from the children critical reading responses.

The terms question and questioning patterns as defined in the study are used as follows: a question is any interrogative verbal action made which has the overt intention of soliciting a response; question patterns are the percentage of memory questions asked and the percentage of critical reading questions asked by the same person.

The importance of a teacher's questioning pattern has been high-lighted by recent research (Taba, 1964) which shows that the kinds of questions teachers ask circumscribe the kinds of thinking children do. Guszak in his conclusions states that a teacher who limits questions to the literal level is limiting the children's development to that level (Guszak, 1967). If Bloom's findings are accepted, and the average child has attained 75 percent of his intellectual development by the age of eight, the thinking habits formed between six and eight are extremely important. Yet Gallagher (1964) found that most teachers ask a large proportion of questions which focus upon the memorization of facts. This was borne out in the area of reading instruction by the findings of Guszak (1966).

The research of Wolf et al. (1968) has indicated that emphasis upon word drills and literal comprehension activities may have the incidental result of teaching the

children to accept printed material indiscriminately. While the word activities belong to cognitive teaching techniques, the learned, unquestioning acceptance of printed matter, whether intended or incidental, is affective and attitudinal in type. Clearly there is a vital need to stress both dimensions, i.e. cognitive and affective, if non-productive, incidental learning, especially in the early years, is to be avoided.

Questions can be so stated that the emphasis is placed upon the pupil's feelings and require from him an expression of his interests and attitudes, i.e., responding, valuing, or manifesting a value as characteristic behavior. If intellectual development hinges upon appropriate opportunities for learning, can it not be speculated that affective development also can be furthered by involving the learner emotionly? Literal comprehension skills do not reflect reading as <u>reaction</u> to facts i.e., it takes engagement in critical thinking while reading to come to the realization that reading includes reacting to the message. New thoughts and feelings that flow from the reaction will help the learner to develop the concept that reading is more than grasping the facts.

It would seem to follow logically that preservice training for teachers must enable the trainees to master concepts basic to directing the cognitive and affective growth of their students. These concepts are available to

all teachers today in the explicit form of two taxonomies (classifications) to be discussed further in Chapter II. These two classifications of educational objectives were the constructs used in this study. They provided the framework within which preservice teachers could develop their questioning patterns so as to elicit critical, analytical, and evaluative responses from their pupils.

It is assumed that in the light of this and similar studies a reasonably certain priority system of teaching teachers could be developed. This could well be included in the content of reading courses for preservice teachers or in the material of inservice workshops led by reading specialists. If such priorities can be demonstrated, the system might be accepted by general methods instructors who, at present, are opposed to including units dealing with the teaching of reading in their courses.

Statement of the Problem

The research problem as stated in the study was to determine the influence of three instructional strategies upon the questioning behavior of preservice teachers. The three strategies involved: conventional instruction on reading approaches; instruction pertaining to the affective domain; instruction pertaining to the cognitive domain. Teacher performance was evaluated by using a verbal interaction analysis system.

General Questions

Stemming from the above problem, but preceding the formulation of specific research questions in the mind of the investigator were the following questions:

1. Is there an actual difference in the three instructional strategies which will be revealed in the resultant questioning behavior of the preservice teachers?
2. Does a real difference exist in the number of memory and critical-type questions asked by preservice teachers?

CHAPTER II

DERIVATION OF CONSTRUCTS

Since the purpose of this study was to identify the kinds of training that will be helpful in preparing teachers to ask various kinds of questions, the most relative of the literature examined dealt with four phases of the problem: critical reading; critical reading as it related to the questioning skill of teachers; educational objectives; and interaction analysis. These four phases constitute the variables of the study, represented diagrammatically in Figure 1.

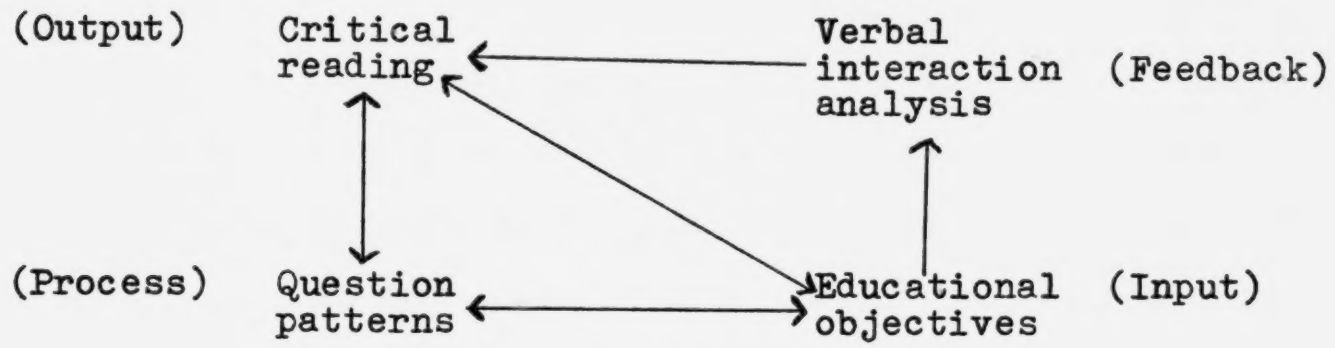

FIG. 1. The Variables in this Study: Critical reading by means of questioning patterns which have been influenced by instruction related to educational objectives, and observed by a verbal interaction-analysis system.

Critical Reading

As a subject of formal instruction, reading is generally considered under the two headings of word recognition and comprehension. The latter term, coined by

Gray, (Cleland, 1965) refers to all the mental and affective activities in which the reader engages as he grasps and reacts to the message. This investigator was not concerned with weighing the diverse definitions of reading comprehension but was concerned with finding the unifying element of the various definitions since that element might serve as an operational description of critical reading.

One group of educators (Gephart, 1969) agreed that interpretation, analysis, synthesis and evaluation comprised critical reading. Guszak's finding (1966) that the teachers he tested had only low to average rate of understanding of comprehension theory, and Bruner's (1966) and Guilford's (1968) insistence upon the need for theoretical concepts of the science of teaching as well as subjective competency on the part of teachers fit in well with the findings of Mary Austin and her associates (1963) regarding the insecurity of teachers. Knowledge of theoretical concepts regarding critical reading could be a factor in lessening this insecurity. As a consequence, this investigator accepted as an operational definition: critical reading activities include analysis, interpretation, synthesis and evaluation. Among the conditions listed by Robinson (1966) as necessary to bring about critical reading, of immediate concern for this study was the fourth condition given: teachers who ask the kinds of questions which foster inquiry.

Critical Reading and Questioning

Wolf, King and Huck (1968) found a ratio of questions to statements in the verbal behavior of teachers of four to one. They also found that teachers who, in a research project, received instruction in critical reading asked significantly more analyzing and evaluating questions than did the control group of teachers who did not receive such instructions. Their conclusion: special materials and instruction influenced the kinds of questions teachers asked.

Taba's suggestion that the teacher, instead of being a fount of information, should become an adroit guide in the heuristic process (1964) is very popular in education today. In this type of teaching strategy the art of asking questions assumes a crucial role. It would appear that a change in teacher behavior is in order. Logically then it would also appear that a teacher-education program combining understanding of reading comprehension with the acquisition of skill in asking questions would be profitable for pre-service teachers.

Educational Objectives

As mentioned in Chapter I, there is today no dearth of awareness among teachers of the goals and objectives of their teaching. It is the bridge between knowledge and action that is lacking. In order to make the objective workable, some means of categorizing them is essential. This means has been supplied in the two taxonomies used in this study: Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (Bloom et al., 1956) and Handbook II: Affective Domain (Krathwohl, 1964). Figures 2 and 3 offer condensed versions of their content.

1. KNOWLEDGE--recall of specifics and universals, methods and processes, etc.
   - 1.10 Knowledge of specifics--recall of specific and isolable bits of information
   - 1.20 Knowledge of ways and means of dealing with specifics--ways of organizing, studying, judging, and criticizing
   - 1.30 Knowledge of the universals and abstractions in a field

Intellectual abilities and skills

2. COMPREHENSION
   - 2.10 Translation--accuracy in changing one form of communication to another
   - 2.20 Interpretation--explaining or summarizing a communication
   - 2.30 Extrapolation--implications, consequences, etc.

3. APPLICATION--use of abstractions in particular and concrete situations as: application as to the phenomena discussed in one paper of the scientific terms or concepts used in other papers.

4. ANALYSIS--breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit.
   - 4.10 Analysis of elements--as: skill in distinguishing facts from hypotheses
   - 4.20 Analysis of relationships--connections and interactions between elements of a communication
   - 4.30 Analysis of organizational principles--as: ability to recognize form and pattern in literary or artistic works.

5. SYNTHESIS--Putting together elements and parts so as to form a whole.
   - 5.10 Production of a unique communication--as: skill in writing; in speech
   - 5.20 Production of a plan, or proposed set of operations--design an experiment
   - 5.30 Derivation of a set of abstract relations--as: formulate hypotheses

6. EVALUATION
   - 6.10 Judgments in terms of internal evidence, as: ability to indicate the logical fallacies in arguments
   - 6.20 Judgments in terms of external criteria--comparison with other works of recognized excellence.

FIG. 2. Condensed Version of the Taxonomy of Educational Objectives: Cognition Domain.

1.0 Receiving (Attending)--concerned that the learner be sensitized to the existence of certain phenomena and stimuli
- 1.1 Awareness--the learner will merely be conscious of something
- 1.2 Willingness to Receive--the behavior of being willing to tolerate a given stinulus, not to avoid it.
- 1.3 Controlled or Selected Attention--the perception is still without tension or assessment, and the student may not know the technical terms or symbols with which to describe it correctly or precisely to others.

2.0 Responding--the student is sufficiently motivated that he is not just 1.2 willing to attend, but perhaps it is correct to say that he is actively attending--interest objectives.
- 2.1 Acquiescence in Responding--"obedience" or "compliance".
- 2.2 Willingness to Respond
- 2.3 Satisfaction in Response--the behavior is accompanied by a feeling of satisfaction, an emotional response, generally of pleasure, rest, or enjoyment. The category is arbitrarily placed at this point in the hierarchy where it seems to appear most frequently.

3.0 Valuing--it is employed in its usual sense: that a thing, phenomenon, or behavior has worth. The learner displays this behavior with sufficient consistency in appropriate situations that he comes to be perceived as holding a value.
- 3.1 Acceptance of a Value--the ascribing of worth to a phenomenon, etc.
- 3.2 Preference for a Value--the individual is sufficiently committed to the value to pursue it, to seek it out, to want it.
- 3.3 Commitment--"conviction", "certainty beyond a shadow of a doubt". Involvement, loyalty to a position, group, or cause would also be classified here.

4.0 Organization--more than one value is relevant.
- 4.1 Conceptualization of a Value--see how the value relates to those that one already holds or to new ones that he is coming to hold.
- 4.2 Organization of a Value System--ideally, the ordered relationship will be one which is harmonious and internally consistent.

5.0 Characterization by a Value or Value Complex--the individual acts consistently in accordance with the values he has internalized at this level.

FIG. 3. Condensed Version of the Taxonomy of Educational Objectives: Affective Domain.

It is interesting to note that little research has been done in the area of teaching for affective behaviors in reading comprehension. A search of the documents in the ERIC Clearinghouse on Reading turned up few studies related to this aspect of reading. Darling (1968) found that teachers discouraged pupils from becoming personally involved in a story by focusing their comments on the cognitive content. Raths and his associates (1966) also demonstrate that teachers' questions are more concerned with what a pupil knows than with what he feels. Krathwohl (1964) notes that much research demonstrates that cognition and affection can never be completely separated. For this reason the present study focuses on both aspects as they occur in the critical-reading situation.

Critical Reading and Interaction Analysis

In recent years interaction analysis has become a way of studying the teaching-learning process. The Flanders System, for example, pointed up directness opposed to indirectness in teaching behavior, and Flanders found that teachers who exerted indirect influence were more flexible in their teaching. He also found that the more flexibility evidenced by teachers in presenting new content, the more learning occurred in students (1962).

In the present study interaction analysis is used as a post-test instrument because of its capability in observing the realized behaviors sought by educational objectives. If this proves adequate in relationship to the levels of thinking and feeling found in the Taxonomies of Educational Objectives, it could indicate a direction which future instruction could profitably take. The system chosen is that of Gallagher and Aschner (1963) because its authors have developed categories which in effect contain the levels used in Bloom's Taxonomy. The authors have developed such categories as a subsystem of a larger interaction-analysis system designed to describe classroom behavior. Cunningham (1968), Konetski (1969) and Masla (1968) employed that portion of the Aschner-Gallagher System (1965) that deals with questions as a construct which would enable pre-service teachers to generate questions appropriate to problem solving. Because of the satisfactory results indicated in these three studies and because the System has a section devoted just to questions, this investigator chose the same system as the most useful construct to serve as the observational instrument for this study. A translation of the 'thinking levels' of the cognitive domain, and the corresponding 'feeling levels' of the affective domain in the Taxonomies into corresponding 'question categories' of the Aschner-Gallagher system is exemplified in Figures 4 and 5.

Taxonomy of Educational Objectives[1] Cognitive Domain Bloom, B.S., et al. (1956)	Verbal Interaction Category System[2] Gallagher and Aschner (1963)
1.00 Knowledge ...emphasizes the remembering either by recognition or recall, of ideas, material or phenomena...(p. 62) 2.00 Comprehension ...understand the literal message contained...(p. 89) ...grasp the meaning or intent of the material...(p. 144)	Cognitive-Memory ...calls for facts or other items of recall...(p. 186)
Both call for the reproduction of facts.	
2.20 Interpretation ...understand relationships...(p. 93) 3.00 Application ...bringing to bear upon given material the appropriate generalizations or principles. (p. 144) 4.00 Analysis ...detection of relationships... (p. 144)	Convergent ...calls for analysis of given or remembered data...(p. 187)
Both classifications call for the integration of facts.	
5.00 Synthesis ...combining parts in such a way as to constitute a pattern or structure not clearly there before...provides for uniqueness and individuality... creative expression within certain limits. (p. 162)	Divergent ...move in new directions ...creative and imaginative...abstract experimentation...(p. 187) generate own data
Both call for generating new data, when facts are sparse.	
6.00 Evaluation ...criteria including values added to above...thinking about values... (p. 185)	Evaluation ...judgmental character ...(p. 188)
The thinking deals with values rather than facts.	

FIG. 4. Translation of the Cognitive Domain into Verbal Interaction Analysis System.

Assumptions: Critical thinking includes all thought processes beyond the memory category.
Critical reading activities are interpretation, analysis synthesis, and evaluation.

Reading Comprehension	Cognitive Domain	Affective Domain	Verbal Interaction Category System
G	1.00 Knowledge	1.00 Receiving	MEMORY QUESTIONS
R			State...
A	2.00 Comprehension	2.00 Responding	Name... Obey
S	2.1 Literal	(Do you usually...?)	Recall... Will
P	(What...?)	(Is it usual for	Notice... like
	(Is... ?)	you...?)	Observe...Want
Read	(How many...?)	(Are you willing...?)	...saw happen...
the lines	(Did... ?)	(Does...interest you?)	Recognition...
Between	2.2 Interpretation		CONVERGENT Qs
the	(Based on informa-		Interpret...
lines	tion given)		
	3.00 Application	3.00 Valuing	Implicate..Prefer..
	(Use of a princi-	(Should one...?)	Explain...Accept...
	pal)		Describe..Perceive
R	4.00 Analysis	4.1 Conceptualization	Compare...Convince
E		(Do you do...out	Relate...
A	(Why... ?)	of regard for...?)	Anticipate...
C	(Would you...?)	(...should con-	
T	(What way... ?)	sider...)	
		(Do you usually	
		accept?)	
P	5.00 Synthesis	4.1 Conceptualization	DIVERGENT Qs
R	(What ways		Infer...Opine
O	might...?)		Originate...
D	(...could...?)		Hypothesize...
U	(...may...?)		Predict...
C	(What sort of...?)		
E			
Beyond			
the lines			
	6.00 Evaluation	4.2 Organization	EVALUATION Qs
	(How do you feel..?)		Judge...Feel...
	(Do you agree...?)		Think...Value...
	(How many kinds	5.00 Characterization	Order...Regard...
	are...?)		Cheese...Esteem...
	(In your opinion...?)		Outlook...

FIG. 5. Reading and Question Classifications: Key Words.

Specific Questions of the Study

With the selection of the constructs described in this chapter, specific research questions were formulated to amplify the general questions enumerated at the end of Chapter I. These additional questions were:

3. Is there a significant interaction effect between the memory and critical questions and the three strategies?

4. Is there a significant difference in the total number of questions asked among the three instructional strategies?

5. Can intraobserver reliability of .80 be established between two sets of ratings separated by time which were obtained with the interaction analysis instrument during the post-test by trained observers?

6. Can an interobserver correlation coefficient of .80 be established between two sets of ratings obtained by separate teams of raters of the scores obtained?

7. Is there a high rate of agreement between the ratings made by the trained observers and those made by the investigator?

8. Can an intraobserver reliability of .80 be established between the ratings separated by time on the interaction analysis instrument used by the investigator to classify questions during the post-test?

Basic Assumptions

The following basic assumptions underly this study:

1. The three intact classes in this study did not differ significantly in ability to ask literal and critical level questions prior to instruction.

2. The questions asked during all reading lessons represented the true ability of preservice reading teachers to ask literal and critical level questions.

3. The difference in the ability of preservice reading teachers to ask a greater number and proportion of critical questions, as determined from the data collected was a function of the instruction given.

4. The content of the reading lessons did not affect the questions asked by the preservice reading teachers during the post-test.

5. A question asked at a given level will elicit a response that can be identified with that same level.

6. Critical thinking includes all thought processes beyond the memory category in the interaction analysis system used in this study.

7. Critical reading activities are analysis, interpretation, synthesis, and evaluation. (Gephart, 1969)

8. The actual language and the types of questions used by the teacher are basic to the way the pupil learns for they give direction to the development of his thinking patterns.

Definition of Terms

Terms which apply to this research are defined as follows:

1. A Question is any interrogative verbal action made which has the overt intention of soliciting a response.

2. Question fluency is a term applied to skill in asking questions of any kind (a skill that is a pre-requisite for developing the more important and complex skills of asking convergent, divergent, and evaluative questions.)

3. Question patterns are the percentage of memory questions asked and the percentage of critical-reading questions asked by the same person.

4. Critical reading is the term applied to mental activities occurring simultaneously with the decoding of a message that include analysis, interpretation, synthesis, and evaluation.

5. Critical thinking includes all thought processes beyond the memory category. (Figure 1, p. 7)

6. Taxonomy or Handbook of the Cognitive Domain is shown in a condensed version in Figure 2, p. 11.

7. Taxonomy or Handbook of the Affective Domain is shown in a condensed version in Figure 3, p. 12.

8. Strategy 1, for the traditional group, refers to the class of subjects which received instruction in the

nature of reading and the place of questioning in reading instruction. No specialized instruction on questioning was included. Instead, traditional approaches to reading instruction were studied.

9. Strategy 2, included instruction on the nature of reading and the place of question fluency in reading instruction. In addition, it included the specialized instruction and practice in classifying and constructing questions on the various levels of the affective domain. (See Figure 3)

10. Strategy 3, included instruction on the nature of reading and the place of question fluency in reading instruction. In addition, it included instruction and practice in classifying and constructing questions on the various levels of the cognitive domain. (See Figure 2)

Delimitations

This experimental investigation was delimited as follows:

1. Ability of the investigator to compile two instructional strategies that would cause preservice reading teachers to ask both a greater number and higher proportion of critical reading questions.

2. Population studied. The traditional group consisted of 40 students in Methods of Teaching Language Arts

at a large midwestern university. The experimental groups consisted of 40 students each, enrolled in language arts methods classes at the same university.

3. Ability of the investigator in categorize questions from recordings made of the 10 minutes interaction between teacher and pupils which were abstracted from a 30 minute reading lesson.

4. Ability of the investigator to teach both strategies to preservice reading teachers.

CHAPTER III

DESIGN AND PROCEDURES

Introduction

In the present study, the general purpose has been to analyze the difference among question patterns of pre-service teachers who have been involved in three different instructional strategies. The basic concern has been the difference that exists among the kinds of questions asked by each teacher as these might relate to instructional strategies. More specifically, the kinds of questions dealt with were: cognitive-memory, and critical, i.e., convergent, divergent and evaluative. The instructional strategies were presented in two phases. The first phase was the same for each of the three treatment groups; it included the study of the nature of reading and the place of question fluency in reading instruction. The second phase differed for each group: one included the study of traditional reading approaches, the second, a study of a taxonomy of the affective domain, and a third the study of a taxonomy of the cognitive domain. The second phase differed with regard to instructional content but in each case the content was related to the use of questions. The classification for the kinds of question asked was the Aschner-Gallagher System.

This chapter presents relevant information concerning the population, instruments, and procedures used in the experimental investigation. The population studied was preservice language-arts teachers enrolled at Indiana University. One instructor from the same university administered the treatment strategies.

A four-category system of question classification was used as the major data gathering instrument. The experimental groups were given post-tests following the administration of the two phases of instruction.

Hypotheses

Three hypotheses were tested, they are:

1. There is no significant difference in the number of memory and critical questions asked in a given period of time by preservice teachers who have been given instructional strategies pertaining to (a) traditional reading approaches, (b) the affective domain of educational objectives, and (c) the cognitive domain of educational objectives.

2. There is no significant difference between the correlation coefficient arrived at by two teams each consisting of two trained observers, and a correlation coefficient of .80.

3. There is no significant difference between the

correlation coefficient obtained from ratings yielded by the two teams of trained observers and the ratings done by the investigator, and a correlation coefficient of .80.

Description of Population

Changing teacher behavior is often a difficult task. Turner (1964) found that teachers were not apt to change their teaching practices after three years of teaching experience. He also found that methods courses have a definite effect on the formation of behavioral patterns in teachers. In this study the choice of preservice teachers was made on the strength of Turner's results which indicated that the content of methods courses affects future teacher behavior. It was determined to limit the teacher population chosen to a highly pertinent instructional area. The Right to Read Program which has taken priority over other areas in the efforts of the Federal Government made the choice of teachers of reading desirable.[1]

Three intact college classes of preservice language-arts teachers were used during this investigation. One class was prepared traditionally while two classes were

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[1]1970 opens a decade marked by a national endeavor to offer every citizen of this country capable of reading the opportunity of adequate instruction. The effort to enable the people of this nation to read, and to like to read, was launched by the United States Commissioner of Education, James Allen and is known as "The Right to Read--Target for the 70's" (Allen, 1969).

administered the experimental portion of this study. The traditional class was composed of 39 students; enrolled in a language-arts methods course. The two experimental groups were each composed of 40 students enrolled in a similar course during the same semester. A strategy was randomly assigned to each group. Before a random sample was taken from the population two subjects were lost through absence and four due to previous experience with Bloom's Taxonomy. The population then became, 37 for the traditional group (Strategy 1), 38 for the affective group (Strategy 2) and 37 for the cognitive group (Strategy 3).

Instructor and Trained Observers

One instructor administered the strategies during this investigation. The instructor was a doctoral candidate in general education with a master's degree in reading and was a teaching assistant in the language-arts methods courses. The instructor was the investigator and taught all three strategies.

After completion of the post-tests, observers were hired from among the language-arts methods students. Four girls were selected because they showed evidence of ability to handle the concepts. They asked intelligent questions regarding the interpretation of criteria established,

during class discussions. The data was coded so that the subjects were unknown to the raters.

Training required three weeks during which the trainees worked independently for approximately fourteen hours each, and with the investigator in a group for a total of six hours. The independent study involved the completion of copyrighted programs (not yet commercially available) dealing with the classification of questions which was the same as that used in this study. (Ladd, 1969, Konetski, 1969) It also included practice in classifying the data for the purpose of establishing a common interpretation of the distinctions made by the authors regarding the categories (Appendix D). When necessary, these distinctions were refined in terms of the Taxonomies of Bloom and Krathwohl. Figures 4 and 5 contain the abbreviated distinctions. When the investigator was satisfied that all four raters had established the same criteria on which to base judgments, the actual evaluation of the transcribed data began.

Procedures

Each intact class was considered a random group because the registration procedure for language-arts courses distributes students into these classes in a random fashion as they report to the place of registration. No

pretest was administered since this study sought an analysis of variance among classes receiving different instruction. A strategy was randomly assigned to each of the groups, hereafter, referred to as: the traditional group, the affective group, and the cognitive group, according to the content of instruction used in the second phase of the differing strategies.

The strategies were administered to the three groups in regular class periods of forty-five minutes each. There were four periods during the first week according to the students' regular schedules. There were two the following week. The traditional group met at 8:30 A.M.; the affective group met at 10:30 A.M.; and the cognitive group met at 11:30 A.M.

Question-pattern scores resulted from the post-tests used to collect data from each group. The post-tests were based on the teaching of an informational type reading lesson to small group of volunteer children from the second, third, fourth, fifth, and sixth grades of a nearby elementary school. Ten randomly selected members from each strategy group were randomly assigned to each group of pupils. The lessons took place during the normal school day in a room other than the classroom. Teacher-pupil interaction was videotaped. The ten minutes immediately following the guided silent reading of the story were extracted and audiotaped, the questions occurring during

this period were transcribed for presentation to the teams of trained observers.

The questions were classified by two teams of two observers each according to criteria established during the training period of the observers, which preceded the actual evaluation of the data. Figure 4 in Chapter I contains the criteria upon which judgments were based. Appendix D contains a fuller explanation.

Question classification depended on the concensus of the two team members. The sums of memory, convergent, divergent and evaluative type questions decided by one team were averaged with the sums determined by the other team to produce the final scores for an analysis of variance.

Treatment Strategies

The treatment strategies were designed by the investigator. They included two phases the first of which was the same for all three groups. It was designed to develop an awareness of the value and place of questioning as a tool of checking reading comprehension.

The first period, which involved the common phase of the strategies took one class period of 45 minutes. The instructor showed a seven-minute film on question fluency ("Question Fluency," General Learning Corporation, 1969), which was followed by a seven-minute written evaluation of

the film. The film itself focused on the teacher's role in checking comprehension via questioning. Questioning was then related to reading by the instructor who explained the nature and behaviors of reading using explanations developed from the content of Appendices A and B. Five more 45 minute class periods were used for phase two during which the instruction content differed according to group.

Strategy 1 for the Traditional Group: Reading Approaches

Second day: A further look at reading behaviors with an explanation of how reading approaches differ in emphasis on word analysis and comprehension activities. The explanation was based on the schematic representation in Appendix B. This was followed by a comparative look at six approaches currently in use in elementary schools, noting the typical elements of each system. Appendix C was the construct used as it is a continuation, parallel to Appendix B.

Third day: An examination of materials presently used in a linguistic approach to reading instruction. An explanation of the descriptors used to characterize this approach was given by the instructor and the students viewed a videotape of a live lesson. A discussion followed with the instructor demonstrating the main ideas of a linguistically based lesson on the chalkboard.

Fourth day: A brief comparison of the descriptors of a "language-arts" or "language-experience" approach with those of the lingustic approach. The students viewed a pre-recorded live lesson and were told to focus on two facets of the lesson: 1) vocabulary controls, and 2) the teacher's use of lead questions to direct the children's thinking.

Fifth day: A very brief exploration into the basal approach to reading, relating it mainly to question fluency. Materials were examined in the curriculum materials center. This included the selection of a story requiring approximately five minutes reading time. This process was followed by fifteen minutes devoted to generating questions based on the story. No mention was made of the quality of the questions.

Sixth day: Instructional reading materials were again examined in the curriculum materials center. The instructor explained a variety of materials traditionally used with the approaches that appear in Appendix C. The students then selected materials upon which to base a final fifteen-minute practice session on question fluency.

Strategies 2 and 3: Taxonomies

These two experimental strategies differed according to the Taxonomy used. Strategy 2 emphasized the affective domain, or the internal commitment of the learner to the content under consideration. Practice in classification and construction of the questions stressed the personal involvement of the pupils in terms of awareness, response, valuing, conceptualization of values, and the organization of values into personal value systems. The questions were analyzed for word patterns cues that usually indicated a given category. For example, typical sentence forms for value questions could be, "Should one . . .", and "Do you usually . . .". Further examples of sentence forms can be found keyed into the center column devoted to the affective domain, and in the left column for the cognitive domain, in Figure 5 on page 15.

The same procedures were carried out in Strategy 3 with the cognitive domain. Practice in classifying and constructing questions was based on the thinking levels of recall, comprehension, application, analysis, synthesis and evaluation. Sentence forms which frequently appeared were again noted, examples can be found in Figure 5.

The students receiving Strategy 2 were not introduced to the cognitive domain, nor was the other group introduced to the affective levels. Acknowledgement that such existed was made and the students were told that further study of it would be pursued later in the course.

Strategy Two: Affective Domain	Strategy Three: Cognitive
Second day:	The concept of a "taxonomy" was explained by the instructor. And a condensed version of the taxonomy to be used was distributed. Sample questions were used to demonstrate how the levels served as a way to organize one's thinking for constructing questions on a variety of levels. The levels were then related to the reading behaviors noted in Appendix B the previous day. The instructor called attention to the descriptors or key words which distinguished one level from another. The students listened to a short story taken from a fifth grade text previously recorded audially for the purpose of knowing the content actually stated in the story. This was followed by classifying the kinds of questions found in the teachers' manual. The latter proved to be mostly of the recall type.

Third day: The students read a randomly distributed article from Education Digest which took an average of ten minutes to read. They practiced generating questions after the reading and then classified them according to the given taxonomy. Each student worked with a partner and discussed his reason for classifying a question as he did. When disagreement with a partner occurred the students referred to the Handbook for further clarification.

Fourth day: Practice was given in rephrasing statements found in the handbooks to form questions on the various levels. Partners discussed their interpretations of the levels as found in the Handbooks. The students were introduced to sample teachers' manuals of the 3rd, 4th and 5th grades. Sample questions were selected by the instructor and given to the students orally for the purpose of classifying them. This was immediately followed by general discussion.

Attention was called to the places in typical lessons where questions occur, i.e., to guide a silent reading, to check comprehension and frequently, to arouse curiosity in a subject.

Students were assigned the task of memorizing the cognitive or affective levels and their descriptors, independently, over the ensuing weekend.

Fifth day: The students randomly selected available teachers' manuals for the purpose of examining the questions contained in the lessons. Practive in classifying, rephrasing and constructing questions was based on what they found in the manuals. (The series of texts and the accompanying manuals to be used in the post-test had been removed from the curriculum materials center a week earlier.) Students paired off for the above activity. This was done in an effort to give each student immediate feedback from his partner. The instructor circulated among the students. Again, the Handbook as well as the condensed versions of the Taxonomies served as a reference when disputes arose. Agreement was not always reached.

Sixth day: Children's editions of reading texts were randomly assigned to the students for the purpose of reading a short story in order to practice formulating questions on a variety of levels. This was individual work using the Handbook or the instructor as a resource.

Organization of the Data

Observers trained by the investigator, categorized questions from the typed transcripts made from the audio-taped recordings. These recordings were made of reading lessons presented by the subjects during the post-tests. For the purpose of data analysis, questions were categorized into cognitive-memory and critical questions. The latter category included convergent, divergent and evaluative type questions. The scores arrived at by each team were averaged to produce the final scores.

Questions	Treatments		
	Strategy 1 (Traditional) Instruction	Strategy 2 (Affective) Instruction	Strategy 3 (Cognitive) Instruction
Cognitive-memory			
Critical			

FIG. 6. Analysis of Variance Table

Main Effects

The 3 X 2 analysis of variance with repeated measures, was used to study the differences between strategies and question patterns. The main effects were studied for the number of cognitive-memory and critical questions asked.

Interaction or Differential Effects

The 3 x 2 analysis of variance with repeated measures was used to study the interaction effects between strategies and questions patterns.

In addition to testing the difference across the three groups through an analysis of variance, the difference between groups in pairs was tested through the use of the t test.

Reliability: Observers and Investigator

The data was analyzed by two separate methods. Trained observers in the form of two teams of two raters each yielded one set of ratings which represented the average of the two teams. A second set of ratings resulted from the analysis of the data by the investigator. This procedure was done in an effort to determine whether or not investigator ratings revealed a correlation coefficient similar to that of the trained observers.

Hypothesis (2), which related to the reliability between and within the two teams of trained observers, was tested by the Pearson and Scott correlation coefficients.

Intra-observer reliability was established by having the two individual teams of observers repeat their judgment of the first set of questions evaluated after their having rated the other 29 sets of questions. The agreement of their judgment would confirm reliability. Scott's formula (Scott, 1955) was used to determine the reliability coefficient. It is:

$$\pi = \frac{Po - Pe}{1 - Pe}$$

where Po (observer proportion agreement) represents the proportion of agreement between the two observations while coding the same data at a different time; and Pe is the proportion of agreement to be expected on the basis of chance. Pe was calculated by summing the squared proportions of the entire sample that falls within each category.

The interobserver reliability was established by applying the Pearson product-moment correlation to the ratings of the two teams of two members each.

Hypothesis (3), which related to the reliability of the investigator and the trained observers, was tested by means of the Pearson and Scott correlation coefficients.

The inter-investigator reliability was established using the Pearson product-moment correlation on the averaged ratings of the two teams of observers and the ratings of the investigator.

Intra-investigator reliability was established by ascertaining whether the investigator could reliably analyze six sets of questions one month after the original analysis. The six sets were selected at random from among the 30 sets of questions already analyzed by the investigator. The Pearson product-moment coefficient correlation was used to measure the degree of agreement on the two sets of ratings separated by time. In addition, the intra-investigator reliability was measured in the same way that the intra-observer reliability was measured using the Scott formula.

In summary, three groups of preservice teachers were administered treatment strategies designed to influence the kinds of questions these teachers would subsequently ask in a reading-lesson post-test involving children. These questions were analyzed and classified according to four categories established by Aschner and Gallagher. The four categories are listed in Appendix D. The scores thus obtained were treated as the data for the analysis of variance which was applied to determine whether any of the strategies administered would influence the kinds of questions asked by the preservice teachers.

Intra-observer reliabilities and intra-investigator reliabilities were established by means of the Scott correlation coefficient. Inter-observer reliability between the

the teams of trained observers and between the combined teams and the investigator were established by means of the Pearson correlation coefficient.

CHAPTER IV

ANALYSIS OF THE DATA

This chapter presents data pertaining to the following: (a) the categorization of kinds of questions utilized by 30 elementary preservice teachers of language arts after having been instructed regarding three strategies designed by the investigator, (b) interobserver and intraobserver reliability of the two teams of two raters each who evaluated the questions, (c) the reliability of the trained raters' scores when compared with the investigator's scores on the evaluation of the questions asked, (d) and other aspects of question-asking behavior.

Statistical Hypotheses

1. There is no significant difference in the number of cognitive-memory and critical questions asked in a given period by preservice teachers who have been administered three instructional strategies.

2. There is no significant difference between the correlation coefficient arrived at by two teams each consisting of two trained observers, and a correlation coefficient of .80.

3. There is no significant difference between the correlation coefficient obtained from ratings yielded by the two teams of trained observers and the ratings made

by the investigator, and a correlation coefficient of .80.

3. There is no significant difference between the correlation coefficient obtained from ratings yielded by the two teams of trained observers and the ratings done by the investigator, and a correlation coefficient of .80.

Related Questions

1. Is there a significant difference in the effects of the three instructional strategies as revealed by the questioning behavior of preservice teachers?

2. Is there a significant difference in the number of cognitive-memory and critical questions asked by the preservice teachers?

3. Is there a significant interaction effect between the cognitive-memory and critical questions and the three strategies?

4. Is there a significant difference among the three instructional groups with regard to the total number of questions asked?

5. Can intraobserver reliability of .80 be established between two individual sets of ratings separated by time and the evaluation of 30 intervening sets of ratings?

6. Can an interobserver correlation coefficient of .80 be established between two sets of ratings obtained by separate teams of raters on the scores obtained?

7. Is there a high rate of agreement between the ratings made by the trained observers and those made by the investigator?

8. Can an intra-investigator reliability of .80 be established between the ratings separated by time on six sets of individual ratings?

Hypothesis 1. There is no significant difference in the number of cognitive-memory and critical questions asked in a given period by preservice teachers who have been administered three instructional strategies.

An analysis of variance technique was used to analyze the question patterns which were recorded by means of ordinal numbers. A summary of this analysis based on the ratings derived from the two teams of trained observers is presented in Table 1.

TABLE 1

Strategies X Question Patterns. Analysis of Variance with Repeated Measures for the Number of Questions Asked.

Source of Variation	d.f.	SS	M.S.	F
Strategies (3)	2	72.40	36.2	1.28
Question patterns	1	260.41	260.41	4.52*
Interaction	2	105.73	52.87	.91
Total	5			

*Significant at .05 level.

Main Effects of Strategies

Question 1. Is there a significant difference in the three instructional strategies as revealed by the questioning behavior of preservice teachers?

Table 2 represents the mean number of questions asked during the post-test for each strategy. This table reports on the data analyzed by the trained observers.

The F value found for strategies was 1.28. This value failed to reach the 3.34 required for rejection of the null hypothesis at the .05 level of significance for 2 degrees of freedom. The main effect for the strategies was found to be non-significant.

TABLE 2

Main Effects of Strategies.

	Instructional Strategies		
	1 Traditional	2 Affective	3 Cognitive
Questions	13.85	16.45	15.75

Main Effects on Question Patterns

Question 2. Is there a significant difference in the number of cognitive-memory and critical questions asked by the preservice teachers:

Table 3 represents the combined means of all the strategies for each of the two kinds of questions asked during the post-test. This table refers to the data analyzed by the trained observers.

TABLE 3

Mean Number of Kinds of Questions Asked

	Instructional Strategies			
	Traditional	Affective	Cognitive	Combined
Memory	17.20	19.10	16.00	17.43
Critical	10.50	13.80	15.50	13.27

The obtained F value of 4.52 for the question patterns was significant at the .05 level for 1 degree of freedom. The tabled f value is 3.33. The hypothesis that the means differed between memory and critical questions was retained as tenable.

Since the cognitive group showed a tendency toward asking a greater number of critical questions when the cognitive and traditional groups were compared, the

researcher found it appropriate to extend the statistical analysis. An a posteriori hypothesis was therefore formulated:

There is no significant difference between pairs of groups regarding the kinds of questions asked.

The results of the multiple t test of difference on critical questions between the traditional and affective, traditional and cognitive, and affective and cognitive are shown in Table 4.

TABLE 4

Multiple T Values Between Groups When Such Are Paired.

	Strategy I (Traditional)	Strategy II (Affective)	Strategy III (Cognitive)	T value
Av. Mean	10.5	13.8	15.5	
Strategy I	0	3.3	5.0*	3.93
Strategy II	3.3	0	1.7	
Strategy III	5.0	1.7	0	

*At the .05 level of significance.

Table 4 lists a T value of 3.93 for the cognitive and traditional groups. A table value of 2.54 was needed for the multiple t test at the .05 level. The a posteriori hypothesis was rejected.

Interaction Effects of Strategies and Questions

In Figure 8 the interaction effects of strategies and questions are graphically represented. The patterns of variation occurring in the affective group was similar to the pattern of variation occurring in the traditional. This is indicated in the graph by the almost parallel lines. The pattern of variation for the cognitive though tending to differ was on the decrease as were the others. When all the lines decrease they are said to be parallel. After observing the graphical representation for the three variable interaction, one might expect this interaction effect to be significant. However, this distortion is a function of the graphic intervals. Actually the lines go in parallel directions.

The obtained F value for the strategies and memory and critical question patterns by direction effect was .91. For 2 degrees of freedom the table's value is 3.34. Therefore, the interaction effect was not significant.

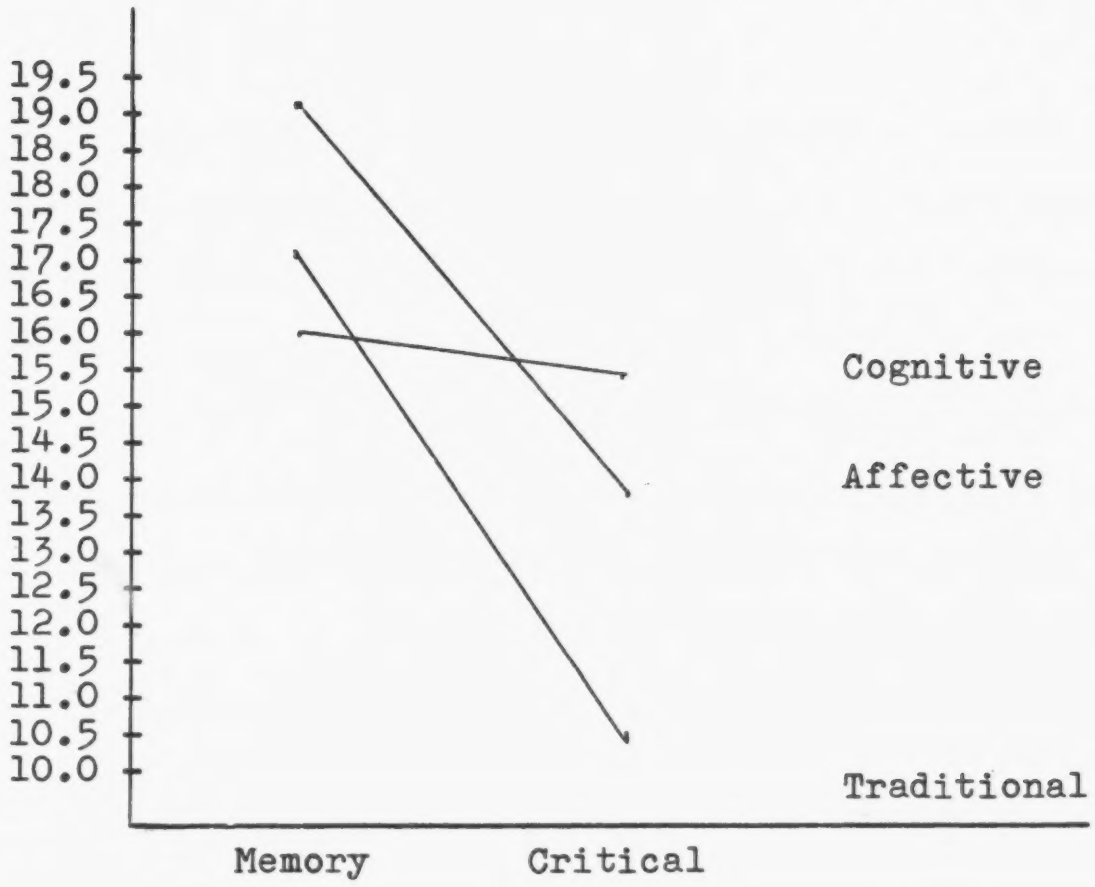

FIG. 7. Strategy Means for Question Patterns at Each Level of Direction.

Total Number of Questions Asked

In pursuit of learning as much as possible from the data; the following question arose.

Question 4. Is there a significant difference among the three instructional groups with regard to the total number of questions asked?

A chi square treatment applied to the frequencies yielded by the ratings of the trained observers revealed a significant difference at the .08 level of confidence among the three strategies on the total number of questions asked.

Table 5 contains the total sums involved. A chi square value of 5.99 would indicate significance at the .05 level for 2 degrees of freedom, and 4.60 for .10 level. The data yielded a value of 4.99. Both the affective and cognitive groups yielded more questions than did the traditional group, the sums were 329 for the affective group and 315 for the cognitive group while the traditional group totaled 276.

TABLE 5

Chi Square Value of Total Questions Asked.

	Instructional Strategies			X^2 Value
	Traditional	Affective	Cognitive	
Cognitive-memory	172	191	160	
Critical	104	138	155	
Total	276	329	315	4.99

Analysis of Observer Reliability

Hypothesis 2. There is no significant difference between the correlation coefficient arrived at by two teams each consisting of two trained observers, and a correlation coefficient of .80.

Question 5. Can intraobserver reliability of .80 be established between two individual sets of ratings separated by time and the evaluation of 30 intervening sets of ratings?

Scott's reliability coefficient was used to measure the two teams of observers' reliability of classifying questions asked during the post-test. The results of this analysis are reported in Table 6.

TABLE 6

The Intraobserver Reliability for Team One.

Categories	Proportion of Questions Asked			
	Observation			
	Before	After	Difference	$(Av.)^2$
Cognitive-Memory	44.8%	48.3%	3.5%	21.71
Convergent	41.4	37.9	3.5	15.72
Divergent	10.4	10.4	0	1.08
Evaluative	3.4	3.4	0	.12
	100	100	7	38.63

According to Scott's formula $\pi = \frac{Po-Pe}{1-Pe}$ an average of four categories yielded a correlation of .89 for the first team of observers. Scott (1955) reports that a correlation of .85 is respectable for intraobserver

reliability. Team Two which showed a reliability coefficient of .88 is reported in Table 7.

TABLE 7

The Intraobserver Reliability for Team Two

Categories	Proportion of Questions Asked			
	Observation			
	Before	After	Difference	$(Av.)^2$
Cognitive-Memory	37.9%	37.9%	0%	14.36
Convergent	51.7	48.2	3.5	24.95
Divergent	6.9	10.4	3.5	.75
Evaluative	3.5	3.5	.0	.13
	100	100	7	40.18

Question 6. Can interobserver correlation coefficients of .80 be established between two sets of ratings obtained by separate teams of raters on the scores obtained?

Interobserver Reliability

Interobserver reliability was established on the trained observers by means of the Pearson product-moment correlation treatment. Table 8 reports the findings of the reliability check.

TABLE 8

Interobserver Reliability of Trained Raters

	Correlation Coefficients
Cognitive-Memory Questions	.93
Critical Questions	.87

The goal of establishing a point .80 reliability, which was indicated by the authors of the instrument used as within the possible range of reliability, was reached (Simon, 1967). Concensus of the raters yielded judgments that were reliable at a correlation coefficient of .937 on memory questions, and a correlation coefficient of .873 for critical questions.

Hypothesis 3. There is no significant difference between the correlation coefficient obtained from ratings yielded by the two teams of trained observers and the ratings done by the investigator, and a correlation coefficient of .80.

Investigator Reliability

A second set of ratings was derived from the analysis of the data by the investigator and was used to determine whether the investigator's ratings revealed a correlation coefficient similar to that of the trained observers.

Question 7. Is there a high rate of agreement between the ratings made by the trained observers and those made by the investigator?

Table 9 reports the results of the comparison of the trained observers' ratings with the investigator's ratings.

TABLE 9

Interobserver Reliability of Trained Raters and the Investigator.

	Pearson r Correlation Coefficient
Cognitive-Memory Questions	.94
Critical Questions	.86

The Pearson product-moment correlation coefficients of .94 and .86 were accepted as adequate.

Question 8. Can intra-investigator reliability of .80 be established between the ratings separated by time on the questions comprising the data.

Intra-investigator reliability was established by analyzing investigators' ratings of six sets of questions one month after the first rating of the same questions. The six sets were selected at random from among the 30 sets of questions already analyzed by the investigator. The Pearson product-moment coefficient correlation was used to

measure the degree of agreement on the two sets of ratings separated by time. Table 10 reports the findings of this comparison.

TABLE 10

Intra-investigator Reliability Coefficient Correlation

	Correlation Coefficient
Cognitive-Memory Questions	.94
Critical Questions	.84

The Pearson product-moment correlation coefficients of .94 and .84 were accepted as adequate.

Group Homogeneity

General Verbal ability scores were obtained from the students' Scholastic Aptitude Test record which had been submitted upon their entrance into college. This was done in order to establish the degree of homogeneity of each strategy group. Research studies (Wolf, et al., 1968) have tended to support the conclusion that intelligence and general reading ability do affect ability to read critically on the elementary level. Although little research has been done in a similar vein it seemed appropriate to make a judgment of homogeneity based on

this factor in college students. Verbal ability scores were available for eight members of each group and are represented by standard deviation in Figure 8.

The mean percentile for verbal ability in the traditional group of Strategy 1 was 49, the affective group of Strategy 2 was 42, and the cognitive group of Strategy 3 was 45. Figure 8 reveals that within groups ability was not homogeneous in spite of similar mean percentile scores between groups.

The percentile ranks for the members of each group were secured from a table that showed the percentile ranks for a national sample representative of all seniors who centered any recognized two-year or four-year college in the year following their graduation from high school, 1961, (Scholastic Aptitude Test Manual, p. 21).

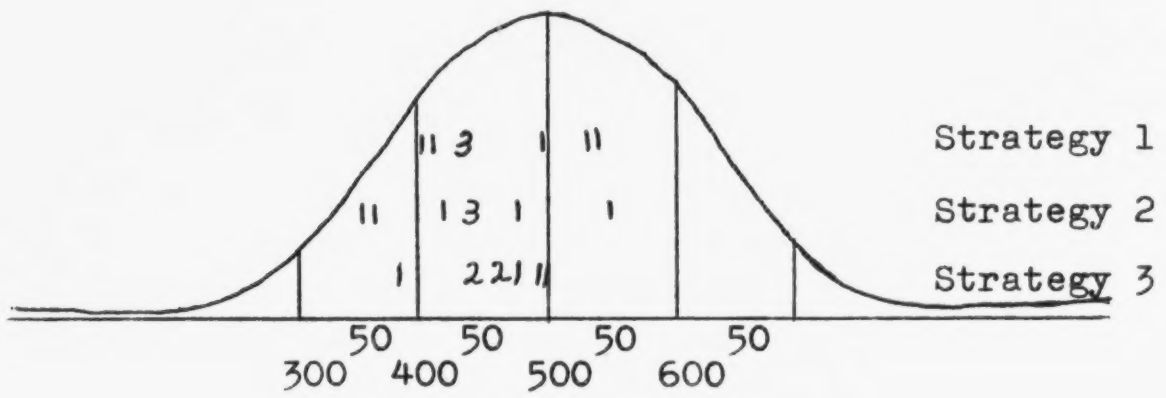

FIG. 8. Group Homogeneity Based on Scholastic Aptitude Test Scores of Verbal Ability.

Strategy 1 or the traditional group had two subjects whose verbal ability scores were within the first standard deviation above the mean, 1 at the mean, and 5 within one standard deviation below. Strategy 2 or the affective group contained one member whose score came within the first standard deviation above, five members within one standard deviation below and two subjects whose scores fell within the second standard deviation below. Strategy 3 or the cognitive group had one subject at the mean, six within the first below, and one in the second standard deviation below. The Scholastic Aptitude Test scores were compared with the Equivalent Scores Table. On the basis of these available scores one might predict a slight advantage to Strategy 1 over Strategies 2 and 3.

Anxiety Manifested During the Post-Test

All of the recorded tapes were analyzed by a social worker who had had professional experience directing anxiety among contacts, and by the investigator experienced as an elementary school principal, in dealing with anxious, beginning teachers. This analysis was done for the purpose of determining the presence of undue anxiety on the part of the preservice teachers during the post-test which was a new situation for them.

The social worker and the investigator had two conferences one in an effort to establish criteria upon which to base judgments, and the other in an effort to resolve differences of opinion between the judges. Table 11 contains the criteria jointly established of those audibly discernible characteristics revealing anxiety which are: unusual repetition of questions; rephrased questions without time for pupil response; nervousness as evidenced by shrillness or inappropriate laughter.

TABLE 11

Frequency of Subjects who Evidenced Characteristics Related to Anxiety.

	Instructional Strategies		
	1 Traditional	2 Affective	3 Cognitive
Unusual repetition of questions, with stammering	0	2	2
Rephrased questions without waiting for a response	1	1	1 2*
Nervousness as evidenced by shrillness		1	
Inappropriate laughter	1		

*2 cases appeared to be related more to the personalities of the subjects than to the newness of the situation.

Table 11 reports the number of people who manifested anxiety according to the established criteria. Within the traditional group, one subject rephrased questions and one subject laughed when such was not appropriate. Within the affective group, four subjects showed signs of anxiety while within the cognitive group three subjects were definitely anxious while two showed mild strain which could be attributed to personality characteristics.

Differences of opinion between the judges stemmed from lack of familiarity with the subjects on the part of the judges. In such cases the opinion of the usual course-instructor was sought to determine whether the behavior was typical of the individual or a result of the new situation, that is, the post-test.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS, AND RECOMMENDATIONS

Summary

Children can and do engage in critical thinking when this is required of them. Teacher awareness of the levels of critical thinking and corresponding levels of feeling could prompt them to require more of children than that which is indicated by reports of current practices. Questions are a prime means for educing various levels of thinking and feeling for they dominate reading instruction as well as instruction in other academic areas. Teacher questions can be influenced by the possession of mental constructs which enable the teachers to organize and evaluate their thinking and practices regarding question-asking behavior. Such constructs are available today in Bloom and Krathwohl's taxonomies of educational objectives in the cognitive and affective domains. This study was designed to show the effects of three instructional strategies incorporating use of the cognitive and affective taxonomies on the kinds of questions preservice teachers ask of children in a setting of reading instruction.

The scope of the present investigation was limited to 120 preservice elementary teachers enrolled in three language-arts methods classes to whom the three instructional

strategies were administered by the investigator. One strategy utilized traditional ways of considering reading approaches without any emphasis on the kinds of questions teachers ask. A second strategy stressed the use of Krathwohl's taxonomy of the affective domain as a means of generating various kinds of questions. A third strategy stressed the use of Bloom's taxonomy of the cognitive domain as a means of generating various kinds of questions.

Data was secured from 30 members of the population randomly selected (10 from each strategy group) by means of a post-test which required the subjects to teach a video-taped mini-lesson in reading to volunteer children from second through sixth grades. Ten minutes of verbal interaction immediately following the silent guided reading of the assigned story were audio recorded and then analyzed. The questions asked by the teacher within that period were transcribed from the tapes and these transcripts became the data upon which evaluation were made. The numbers of cognitive-memory and critical questions were classified by means of four categories established by Aschner and Gallagher: Cognitive-memory, convergent, divergent and evaluative. The investigator subsumed the latter three categories under the label of critical type questions.

Analyses of variance, t tests, and chi-square procedures were applied to the data in order to estimate the effects of the three strategies on the question patterns

of the preservice teachers. Two complete evaluations of the data were performed, one by two teams of two observers each trained by the investigator, and another by the investigator. Reliabilities were established for the inter-observer, and the inter-observer and investigator, by means of the Pearson product-moment formula; and for the intra-observer and intra-investigator by means of Scott's formula (Scott, 1955).

Findings

The following findings are based upon the accumulated data and are within the limitations stated for this study:

1. As a result of the analysis of variance, the three strategies designed to influence the kinds of questions teachers ask did not have significant differential effects stemming from the instruction based on the use of the cognitive, affective and traditional materials.

2. As a result of the multiple t analysis, Strategy III (the cognitive group) did yield statistics indicating the use of a significantly larger number of critical-type questions at the .05 level than did Strategy I (traditional group).

3. Strategy II (the affective group) did yield statistics indicating a favorable tendency toward the increased use of evaluative type questions when compared to the results obtained from Strategy I.

4. Chi-square results indicated instruction in classifying and constructing questions according to the affective or cognitive taxonomies affected the total number of questions asked at the .08 level of significance.

5. A satisfactory intraobserver and interobserver correlation coefficient was obtained for the trained observers' ability, and the investigator's ability to classify questions asked for the purpose of data analysis.

Conclusions and Implications

Several questions were raised in Chapter I which seemed to be of interest to educators. This chapter presents the conclusions and implications that resulted from an interpretation of the data.

Instruction in classifying and constructing questions based on the two taxonomies of educational objectives did not significantly affect the questions asked by the preservice teachers according to the results of the analysis of variance. According to the t test, a difference was found between the cognitive and traditionally taught groups at the .05 level of significance, which favored the cognitive group regarding the number of critical questions asked. It was concluded that the methodology adopted could have even more significant effects under modified conditions. Among the experimental

conditions that could be revised are the following:

1. The terminology used by the investigator, i.e., the use of such words as "taxonomy," "cognitive" and "affective" appeared to get in the way of the understanding sought. For many of the subjects (the exact number is not known because this is based on the investigator's impressions) part of the time available for practice in constructing questions was interfered with because of the terminology which was difficult for preservice teachers to comprehend. In light of this experience the investigator would use a simplified, more familiar vocabulary. For instance, the mental constructs presented as taxonomies of the cognitive and affective domains could be referred to as systems for organizing one's reflections about "thinking" and "feeling" aspects of learning.

2. Practice was also lost by the use of the Taxonomy Handbooks. This procedure overwhelmed preservice people. The condensed versions would have sufficed for the introduction to the constructs pertaining to the affective and cognitive domains.

Although the strategies failed to produce highly significant differences among the groups of the study, tendencies have been revealed which support the use of the cognitive and affective instructional material for question construction. Given more time than the experimental study allowed for the discussion of the thinking and feeling

tasks involved in the particular phrasing of a question and for the adequate practice in constructing and rephrasing of questions the desired skill might be developed.

There is a twofold need for increased time. On the one hand more time would have aided the students in their learning of the ideas contained in the instructional materials; on the other hand, increased time would have permitted assimilation of these new ideas into the student's intellectual patterns of thought. That is, the students could make these concepts part of their way of thinking.

Modification in the instruction sequence might facilitate intellectual assimilation of the concepts presented. Development of three major concepts were involved in the methodologies: (a) the nature of reading which included the affective and cognitive factors, (b) the conditions necessary for critical reading with emphasis on the kinds of questions teachers ask, (c) and development of appropriate questioning techniques. The third concept might have fared better had it been presented first and then the other concepts considered. This modification could have given students the major thrust of the instructional treatment early. As the instruction was presented there was a tendency for the students to think tangentially.

The lack of highly significant differences does not invalidate the constructs used in the instructional strategies but rather points out the limitations of the

study. For example, the lack of homogeneity of strategy groups limited the study. Although the traditional group had the highest composite verbal ability it should be emphasized that it yielded the fewest critical type questions. It could be hypothesized that if the traditional group had an ability that was more comparable to that of the other groups, there might have been increased statistically significant differences.

Evaluative type questions are more closely related to the affective domain since they do not deal directly with facts but rather with values. It is of interest to note that again, although there was not a significant difference found the affective group did exceed the other groups in the total number of evaluative type questions asked. It should be noted that although some questions were expressed in forms using such phrases as "Do you think . . ." or "How do you feel about . . .", they were not classified as evaluative in nature even though the phrases are typical of evaluative type questions. Unless a question involved a conscious criteria for making a judgment, it was not classified as evaluative. At times, such phrases as the above were parts of questions requiring an affective-type response at the "willingness" level, and therefore were classified as a cognitive-memory question in keeping with

the accepted criteria presented in Figure 4 on page 15. Were these criteria interpreted less rigidly, many questions could have been classified as evaluative and changed the complexion of the results of the study.[2]

Divergent Questions

The affective group used considerably more divergent questions reaching a total of 10 as compared to six divergent questions posed by the cognitive group and five posed by the traditional group. Furthermore, of the ten people belonging to the affective group, seven asked divergent questions, while only six did so in the cognitive group and only four in the traditional group.

It would appear that the affective question training favorably influenced the use of divergent questions. This is certainly an area for further investigation. It might well be that the study of affective questioning would be influential in making more teachers sensitive to divergent thought. This, in turn, might be beneficial to increasing creativity within the school domain. Questions formed with the affect in mind seem to add a personalized dimension of

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[2]The data of this study was classified according to the four-category system of Aschner-Gallagher (1963) which is itself based on cognitive operations. Bloom's levels of cognition were translated into the corresponding categories of Aschner-Gallagher system. Krathwohl's rough parallel of the levels of the affective domain as they correspond to the cognitive levels offered further help to the observers in their efforts to interpret the established criteria when evaluating the thinking or feeling task intended by the teacher's questions.

meaning that cannot be rationally explicated but which encourages imaginative participation. Although the affective products cannot be measured as yet, nor for that matter have they been exactly defined, their effects on human thought are undeniable and should be dealt with at least to the point of encouraging their development.

It is the opinion of this investigator that by increasing teachers' sensitivity to the possibilities of critical reading, the critical thought development of the child will be favorably influenced.

Incidence of anxiety as observed during the post-test and reported on pages 50 and 51 were more apparent among the subjects of the affective and cognitive strategy groups than among those of the traditionally taught group. This could have been a by-product of the added emphasis in these strategies on the kinds of questions possible in reading instruction. More experience in the use of the taxonomies as a means of ordering one's thinking about cognitive and affective operations as well as more opportunity for interaction with children might be a way of diminishing undue anxiety.

The raters developed a useful competency for their own efforts at self evaluation. As a result of classifying the questions of the data, their own awareness of the triviality of recall questions as compared with questions that induced critical thinking, grew.

Available programs on questioning such as those by Ladd and Konetski facilitated the training of the observers but were not sufficient in themselves. Consensus of opinion regarding questions similar to those found in the data, required discussion of the established criteria before a common judgment could be made regarding the intent of the questions. The investigator directed the teams' training sessions prior to the evaluations of the data, and in this role she became the final judge as to the intent of a disputed question. In this arrangement, the researcher is prompted to question the need for training observers for this study. The raters' judgments were inevitably influenced by the investigator's training and own judgments. Until such time as observers, proficient in the use of verbal interaction analysis instruments, are readily available to researchers the use of investigator evaluations would probably suffice.

The results of the reliability tests applied to the ratings of the trained observers and the investigators were sufficiently close to support these conclusions. Each type of reliability reported in Chapter IV came within a range considered to be a satisfactory degree of agreement (Scott, 1955).

After noting that the raters were trained by (a) independent use of programs on classifying questions, and (b) by three group conferences with the investigator, for

the purpose of clarifying the distinctions among categories, and, noting that the latter practice could have resulted in judgments made by the raters which reflected possible biased interpretations of the investigator, it may be said that either the trained raters or the investigator could have adequately performed the evaluations of the data. Investigator ratings are preferable, in the opinion of the researcher, since considerable time and expense would be saved.

Recommendations

1. Although the cognitive treatment resulted in a significantly higher number of critical questions, the affective treatment did reveal a favorable influence toward increasing the number of critical questions, it is, therefore, recommended that language-arts instructors of preservice teachers use a combination of both.

2. It is also recommended that the present study be replicated with the revised sequencing, time allotments, and terminology suggested previously on pages 56 to 58. Multiple replication of the study should be carried out in order to obtain different geographic areas and different scholastic periods and contents as experimental conditions. This would improve the validity of the results.

3. Different populations should be investigated for

the effects of either strategy or a combination of both strategies. For example, instruction in classifying, constructing, and rephrasing questions based on the cognitive and affective constructs should be given to inservice teachers of various subjects at both the elementary and secondary levels as well as to preservice teachers majoring in different fields of study. New means of communicating, developing, and encouraging effective questioning techniques should be pursued by means of workshops, continuous-education centers and the like.

4. Attempts should be made to determine if additional significance could be found between strategies if more time were spent rephrasing cognitive-memory and convergent type questions into divergent and evaluative type questions. Six periods totalling four and one-half hours were not sufficient to produce a significant difference at the .01 level among the groups, relative to any one category of questions. This might be accomplished by reducing the content of instruction and using only the condensed versions of the taxonomies. The classification reference sheet could facilitate such an effort.[3]

5. Attempts should be made to determine the benefit of using audiotapes, videotapes and demonstrations in the practice of classifying, constructing and rephrasing questions.

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[3]Reading and Question Classifications, Figure 5, p. 16.

6. Attempts should be made to guage the effectiveness of guidelines which aid the teacher in implementing appropriate questioning techniques.

7. A study of the nature of reading instruction would appear to offer a viable way of beginning a study regarding the various types of questioning.

8. A thorough investigation of those conditions most conducive to successful questioning by teachers is recommended. The results could facilitate the use of the types of questions studied in this experiment. Such a study would have improved the experimental conditions of this investigation.

9. Since questioning techniques are so closely related to the cognitive and affective growth of the child it is recommended that teachers engage in a periodic check on the kinds of questions they employ in each of the academic areas. Knowledge of verbal interaction analysis could aid such self evaluation. Several programs are available for further study.[4] It is recommended that these be seriously considered as a way of improving teacher effectiveness.

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[4]Programs, copyrighted but not yet commercially available, are included in dissertations listed in the bibliography under the names of Crump, and Konetski. A copyrighted program by Ladd is available through the Science Education Office of Indiana University, Bloomington, Indiana.

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APPENDIX

APPENDIX A

THE NATURE OF READING

"READING" is a term used to refer to an INTERACTION by which meaning encoded in visual stimuli by an author becomes meaning in the mind of a reader.* The interaction always includes three facets: (1) material to be read; (2) knowledge possessed by the reader; and (3) physiological and intellectual activities. The variability apparent when the interaction is viewed at different points in time is a result of the variability possible in each of the several facets.[1]

Material to be Read	Knowledge Possessed by the Reader	Activities Engaged in by the Reader
Grapho-phonological Structure	Cognitive base: (Categorized Knowledge) Facts, principles, Rules, constructs	Physiological: Recoding or converting the visual code to an aural code: scan, fix, select, form an image, search, integrate.
Syntactic Structure	Affective and Cognitive bases: (Self Knowledge) Attitudes, beliefs Values	Intellectual: Literal comprehension, Analysis, Interpretation, Synthesis, evaluation
Semantic Structure	(Dominant aspect in proficient reading)	(Dominates beginning reading)
(Dominant aspect in mature reading)		

*Note: This definition does not imply that the meaning intended by the author automatically becomes the reader's meaning. Errors in encoding and decoding mediate against this one for one correspondence.

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[1]Gephart, W. J. "Application of the Convergence Technique to Reading". Paper presented at the Annual Meeting of the American Educational Research Association, February, 1969. Los Angeles, California, pp. 21.

APPENDIX B

BEHAVIOR OF READING INSTRUCTION

IDENTIFICATION — COMPREHENSION

Decoding — Meaning

Linguistic Analysis
Phonetic Analysis
Configuration
Context Clues
Pictures

(Literal Reading) (C R I T I C A L R E A D I N G)

(grasp the meaning)
(read the lines)
author's message
Understand the
Interpretive
(between the lines)
(beyond the lines)
Application
Analysis
(react to the meaning)
Synthesis
Evaluative

Alphabet	Details	
Consonants	Main ideas	
Vowels	Sequence	
Blends	Comparison	Application of above
Affixes	Cause and effect	Application of above
Syllables	Character traits	Analysis of above
Possessives		Synthesis of above
Compounds		Predicting outcomes
Rhyme		Interpreting figurative language
Contractions		
Accent	Receiving and Responding Emotionally	Judgments of reality & fancy
		Judgments of fact or opinion
		Judgments of validity
		Judgments of appropriateness
		Valuing — Judgments of worth
		Conceptualization of values
		Produce

Literal or critical reading is differentiated in terms of the reader's purpose for reading.
The RATE of reading is determined by the purpose for reading.
METHODS of instruction differ according to the emphasis given to identification and comprehension.

Approaches

Phonics	Linguistic	Automated Programed	Basal	Language Experience	Individualized

APPENDIX C

CHARACTERISTICS TYPICAL OF READING INSTRUCTION SYSTEMS

Individualized	(Emphasis on the nature of the learner)	An individualized or personalized approach stresses self-selection and self-pacing. A child selects a book he wants to read. After reading the book he has a conference with the teacher in which some reading is done. The teacher checks on the comprehension and notes the child's need for help in decoding or understanding. The teacher (and maybe the pupil also) records the needs of the pupil for possible group work in skill development.
Language Experience	(Emphasis on the social setting of the learner)	A language-experience approaches builds on a common experience had by the children. They dictate a story about it giving one sentence at a time which the teacher writes on the chalk board or chart. The children may copy the story and practice reading it. The teacher checks word recognition on random words. Related skills are developed at separate periods. This system relates reading, writing, listening and speaking in integrated lesson plan.
Basal	(Emphasis on the total teaching/learning situation)	Basal approaches present new words in context; provide practice in visual and auditory discrimination of words; build a background and set a purpose for reading a selection; guide the silent reading in terms of purposes set; follow up with an application of the concepts learned by means of verbal interaction. Related skills are taught at separate periods.
Automated Programed		Automated or programmed approaches stress active student response to stimuli. Continuous testing, immediate feedback on learning, sequential development of skills, and individualized pacing practices.
Linguistic	(Emphasis on the nature of language)	A linguistic approach is based on the selection of a sound pattern frequently used (ex. at); expansion of the list (mat, sat, cat, etc.); and use of the words in patterned sentences (which also requires the use of some sight words). The regularities in sentences and words are shown through practice exercises. Quick recognition (aural and visual) of letters, letter sequences, and word sequences are sought.
Phonics		A phonics approach emphasizes the identification of new words by association of sounds with graphic symbols. This involves the association of letters, combinations of letters with sounds, and some principles explaining the sounds in words.

APPENDIX D

Explanation of Four-Category System: Asks Questions

Gallagher and Aschner have developed a system containing four categories that are particularly useful for thinking about questions. The four categories are:

4a. Cognitive Memory Questions

These questions call for facts or other items which can be recalled. A cognitive memory question is one that involves rote memory, recognition or selective recall.

4b. Convergent Questions

These are questions which call for the analysis and integration of given or remembered data. Problem solving and reasoning are often involved in this category. The answers to these questions may be predictable, but convergent questions are always broader than cognitive memory questions. You will need to know the background of the pupils in order to determine whether questions call for reasoning or recall.

4c. Divergent Questions

Questions in this category call for answers which are creative and imaginative; which move into new directions; involve abstract experimentation. It calls for generating facts when such are sparse.

4d. Evaluation Questions

These questions deal with matters of judgment, value and choice.

Gallagher, J. J., and Aschner, Mary J., "A Preliminary Report: of Classroom Interaction," Merrill-Palmer Quarterly of Behavior and Development, volume 9, July, 1963, pp. 183-194.

APPENDIX E

POST-TEST GUIDE SHEET

Teacher Preparation E335 Lesson Procedures

(Upon arrival at Saint Charles Elementary School in Bloomington, Indiana, the subjects, or preservice teachers to be post-tested, were taken to a teachers' lounge and given this guide sheet as well as the appropriate reading texts. In addition each subject was assigned a grade, the form used follows in Appendix G. After fifteen minutes, the subjects were directed to an assigned room, where a group of five children had been assembled. Thirty minutes were allowed for the lesson.)

Read the assigned portion of the story.
In the space above write a lead question to set the purpose for the children's reading of the same portion.
Write a variety of questions to ask the children when they have finished their silent reading. (Use the back of this sheet if more space is needed.)

Action!
Meet the small group of children to be taught:
Introduce yourself in some manner similar to this, "I am _____, and I'm a visiting teacher here, please tell me who you are."
Then pass the books immediately and allow the children about 2 minutes to browse.
Tell them the page number of the story and allow a minute for them to examine the pictures.
Talk briefly about the title of the story.
Give your lead question to guide the silent reading. Say, "Now read pages _____ silently, and see if you can answer this question."

Allow a reasonable time for the children to pass up the page that ends the assigned portion of the story.
Have them close their books, then ask the questions you have prepared and any additional questions you think appropriate.

Name _____ Date _____ E335 class time _____

APPENDIX E (Continued)

POST-TEST GRADE ASSIGNMENT

Name_____ Grade_____

Grade 6	Grade 5	Grade 4
New Roads	New Trails	On Top of the Hill
pp. 128-134	pp. 134-136	pp. 133-139
end with ... all over France	end with ... owned.	end with ... racoon's odor.
"The Great Lady of Freedom"	"The Slave Who Became a Great Teacher"	"The Animal That Has Fun"

Grade 3	Grade 2
Hill Top Trails	Up and Away
pp. 34-39	pp. 42-49
end with ... ...tree.	end with ... Ray asked.
"The Boy Without a Tail"	"Animal Surprises"

Fay, L. C., Curriculum Enrichment Series

Sheviak, M. R. (consultant)

Lyons & Carnahan Co., Chicago, 1965.

APPENDIX F

SAMPLE TRANSCRIPTS OF DATA

Subject #17 - Grade 3

1. What did Joey see when he went outside?
2. Did he talk to the squirrel?
3. Did you ever talk to a squirrel?
4. Did he talk back?
5. What keeps the squirrel from falling as he jumps from one tree to the next?
6. What does the tail do?
7. Have you ever walked along a curb with one foot ahead of the other and had to balance yourself?
8. What did you do to balance yourself?
9. Do squirrels ever fall from the trees?
10. Did you ever see a squirrel without a tail?
11. Did you ever see a flying squirrel?
12. What keeps him up in the air?
13. If you jumped from an airplane, what would you use if you were up in the air?
14. What does a parachute look like?
15. What does it remind you of?
16. Have you seen "Mary Poppins"?
17. Can you think of any other animal you would see if you were taking a walk out in the country, on a farm?
18. What kind of animals do you have on your farm?
19. Have you ever visited a farm?
20. What is a helicopter like?
21. Are they fun to ride in?
22. That's kind of dangerous, isn't it?
23. Did you go out there early in the morning?
24. If you lived on a farm and went out early in the morning, what would you find?
25. What do you do in the morning?
26. What does the squirrel do to keep himself warm in the winter?
27. Where does he usually go to sleep?

28. Do you ever put food out for the birds and animals in the winter?
29. Which kind come the most?
30. Did he try to crack it open?
31. What was the reason Joey gave the squirrel for why he didn't have a tail?
32. Why doesn't Joey have a tail--why doesn't he need one?
33. What does he do though--how does he get around?
34. If Joey was going to jump from one tree to another, what would he use?

APPENDIX F (Continued)

Subject #25 - Grade 4

1. Can you think of any other kinds of wild animals that maybe live around here, that you might find?
2. Squirrels, I guess they are, aren't they?
3. Did you notice any comparison between the way raccoons act and the way people act?
4. Now what were some of the things in the story or that you know yourself, how animals are a lot like human beings?
5. What did the story call their hands?
6. Is there anything else they do that is like human beings?
7. They ran away from dogs--Mailmen do, huh?
8. They washed their faces and they're very clean, aren't they?
9. Can you think of anything else?
10. Do people climb trees?
11. How about the way the raccoon's young are born?
12. Why do you suppose the title of this story said it was about an animal that has so much fun--Why did they choose that kind of a title?
13. Why do you suppose we have to train dogs just like people to do jobs--why do you suppose we have to train dogs?
14. How do farmers keep raccoons and bears and things like that away--do they have things that they do?
15. Now what kinds of things do you suppose a dog would have to be taught so that he wouldn't get caught by a raccoon?
16. First of all, what does the raccoon do to the dog, when he is trying to get away?
17. So what kind of thing will the dog have to be able to do?
18. He'll have to learn how to swim, don't you think so?
19. What did it say about raccoons and swimming?
20. Have you ever had any problem with, maybe you go to bed at night and you leave something out by mistake and the next morning it's gone?
21. Well, what do you suppose has happened to it?
22. What kind of an animal do you suppose it probably was?
23. Have you ever had any kind of a raccoon or that type of an animal for a pet?

APPENDIX F (Continued)

Subject #4 - Grade 5

1. Why were the slaves called together on this day?
2. Have you studied about this in school?
3. Can you tell us what slavery was?
4. They weren't on their own, were they?
5. Do you know what war was going on at this time?
6. What did freedom mean to these people?
7. What else could they do?
8. Where did they decide to go?
9. Why did they go to West Virginia?
10. Why do you suppose they went there?
11. Who did they go to see?
12. They might just want to do whatever they want, right?
13. Why did John and Booker have to work?
14. When the family gets poor, everyone has to go to work, right?
15. Where did they work?
16. Would you like to work there--in a salt mine?
17. Would you like to go every day?
18. Would you like to get up at dawn?
19. What was all the excitement about?
20. Why should that be exciting to these people?
21. So you say that they have never had the opportunity and they might want to try, right?
22. How did Booker feel about this man who could read?
23. What else did he think about it?
24. Why didn't he have the opportunity to go to school?
25. Why couldn't he go to school when they were in West Virginia?
26. What did Booker's mother think about his desire?
27. Did she like it or not?
28. Do you remember what the book was?
29. Why do you think it was the most important book he ever owned?
30. And that got him started, right?
31. Don't you think a teacher has to learn how to read first?

APPENDIX G

DATA SUMMARY

Part I Investigator Scores

	S.A.T./V.A.	Sex	Strategy	Post-test Gr.	Total Questions	Investigator						Same--1 month later*					
						Investigator	Memory	Critical Total	Convergent	Divergent	Evaluative	Investigator Repeats	Memory	Critical Total	Convergent	Divergent	Evaluative
1.	500	M	1T	6	14		10	4	4	0	0						
2.	440	M	1T	6	23		13	10	10	0	0						
3.	440	F	1T	5	23		15	8	7	0	1						
4.	530	F	1T	5	31		18	13	11	1	1		18	13	11	1	1
5.	400	F	1T	4	36		25	11	9	1	1						
6.		M	1T	4	16		2	14	8	2	4						
7.		F	1T	3	34		24	10	9	1	0		19	15	14	1	0
8.	440	F	1T	3	36		19	17	16	1	0						
9.	544	F	1T	2	33		21	12	12	0	0						
10.	418	F	1T	2	30		27	3	3	0	0						
11.		F	2A	6	26		3	23	18	3	2						
12.	488	F	2A	6	29		11	18	14	3	1		12	17	13	3	1**
13.	440	F	2A	5	30		19	11	9	0	2						
14.	420	F	2A	5	26		10	16	9	3	4						
15.	440	F	2A	4	34		18	16	12	1	3						
16.		F	2A	4	36		19	17	11	0	6		19	17	11	0	6
17.	340	F	2A	3	34		24	10	9	0	1						
18.	340	F	2A	3	49		31	18	17	1	0						
19.	440	F	2A	2	38		30	8	8	0	0		32	6	6	0	0
20.	550	F	2A	2	27		11	16	14	0	2						
21.		F	3C	6	21		12	9	9	0	0		12	9	8	0	1
22.	499	F	3C	6	29		11	18	16	1	1						
23.	442	F	3C	5	27		18	9	8	1	0						
24.	550	F	3C	5	31		15	16	14	0	2						
25.	440	F	3C	4	23		12	11	9	1	1						
26.	460	F	3C	4	34		19	15	12	1	2						
27.	456	F	3C	3	37		19	18	15	2	1						
28.		F	3C	3	44		26	18	14	2	2						
29.	390	F	3C	2	39		25	14	13	0	1						
30.	451	F	3C	2	30		16	14	14	0	0						
31.	same as #12						12	17	13	3	1		Also case #31**				

*The repeated scores were sought for the purpose of obtaining the intra-investigator reliability using the Pearson formula.

**The repeat on Subject 12's scores was sought for the purpose of obtaining the intra-investigator reliability using the Scott formula.

APPENDIX G (Continued)

DATA SUMMARY

Part II Trained Observers' Scores

		Team I					Team II					Averages				
	Total Qs	Memory	Critical	Convergent	Divergent	Evaluative	Memory	Critical	Convergent	Divergent	Evaluative	Memory	Critical	Convergent	Divergent	Evaluative
1.	14	10	4	4	0	0	10	4	4	0	0	10	4	4	0	0
2.	23	12	11	11	0	0	12	11	10	0	1	12	11	10	0	1
3.	23	19	4	4	0	0	18	5	4	0	1	19	4	4	0	0
4.	31	18	13	13	0	0	18	13	12	1	0	18	13	13	0	0
5.	36	25	11	11	0	0	22	14	13	1	0	24	13	12	1	0
6.	16	0	16	13	1	2	2	14	12	1	1	1	15	13	1	1
7.	34	24	10	8	1	1	20	14	12	2	0	22	12	10	1	1
8.	36	17	19	15	1	3	14	22	19	3	0	16	20	17	2	1
9.	33	23	10	10	0	0	21	12	12	0	0	22	11	11	0	0
10.	30	28	2	2	0	0	27	3	3	0	0	28	2	2	0	0
11.	26	3	23	16	2	5	3	23	19	2	2	3	23	17	2	4
12.	29	13	16	12	3	1	11	18	15	2	1	12	17	14	2	1
13.	30	16	14	11	3	0	17	13	13	0	0	16	14	12	2	0
14.	26	11	15	10	1	4	9	17	10	2	5	10	16	10	1	4
15.	34	24	10	10	0	0	21	13	13	0	0	22	12	12	0	0
16.	36	23	13	9	0	4	23	13	13	0	0	23	13	11	0	2
17.	34	28	6	6	0	0	28	6	4	2	0	28	6	5	1	0
18.	49	34	15	15	0	0	30	19	18	1	0	32	17	16	1	0
19.	38	31	7	7	0	0	33	5	5	0	0	32	6	6	0	0
20.	27	12	15	13	1	1	15	12	10	1	1	13	14	12	1	1
21.	21	12	9	9	0	0	10	11	11	0	0	11	10	10	0	0
22.	29	12	17	16	0	1	10	19	18	1	0	11	18	16	1	1
23.	27	17	10	7	1	2	15	12	9	1	2	16	11	8	1	2
24.	31	19	12	9	2	1	21	10	7	1	2	20	11	9	1	1
25.	23	11	12	12	0	0	8	15	14	1	0	9	14	13	1	0
26.	34	17	17	17	0	0	21	13	12	0	1	19	15	14	0	1
27.	37	20	17	14	0	3	16	21	20	1	0	18	19	18	0	1
28.	44	23	21	17	0	4	27	17	15	2	0	25	19	16	1	2
29.	39	23	16	14	2	0	15	24	24	0	0	19	20	19	1	0
30.	30	15	15	15	0	0	10	20	20	0	0	12	18	18	0	0
31.	29	14	15	11	3	1	11	18	14	3	1	(repeat of #12)*				

*Subject 12's scores were established at the onset of the evaluations and again after the 29 cases were rated for the purpose of securing the intraobserver reliability.